

CLAIMS

[1] A motor driver including:

a current output driver that outputs a drive current fed to a direct-current motor; and

a gain switch circuit that switches a current/voltage gain for a value of the drive current with respect to an input voltage;

the motor driver comprising:

n detection resistors connected in series with a coil of the direct-current motor;

n switches provided one for each of the n detection resistors, each switch having one end thereof connected to an end of the corresponding detection resistor farther from the coil, and having a predetermined direct-current voltage applied to another end thereof; and

n current detection amplifiers provided one for each of the n detection resistors, each current detection amplifier detecting a voltage across the corresponding detection resistor and feeding the detected voltage back to the gain switch circuit;

wherein turning on and off of the switches is controlled according to the current/voltage gain switched by the gain switch circuit.

[2] A motor driver including:

a current output driver that outputs a drive current fed to a direct-current motor; and

a gain switch circuit that switches a current/voltage gain for a value of the

drive current with respect to an input voltage;

the motor driver comprising:

a first detection resistor having one end thereof connected to a coil constituting the direct-current motor;

a second detection resistor having one end thereof connected to another end of the first detection resistor so as to be connected in series with the first detection resistor, the second detection resistor having a different resistance from the first detection resistor;

a first switch having one end thereof connected to a node between the other end of the first detection resistor and the one end of the second detection resistor, the first switch having a predetermined direct-current voltage applied to another end thereof;

a second switch having one end thereof connected to another end of the second detection resistor, the second switch having a predetermined voltage applied to another end thereof;

a first current detection amplifier that detects a voltage across the first detection resistor and feeds the detected voltage back to the gain switch circuit; and

a second current detection amplifier that detects a voltage across the second detection resistor and feeds the detected voltage back to the gain switch circuit;

wherein turning on and off of the first and second switches is controlled according to the current/voltage gain switched by the gain switch circuit.

- [3] The motor driver of claim 2,
wherein, when the first switch is turned on, the second switch is turned off,
and the gain switch circuit corrects the input voltage based on the voltage
fed back from the first current detection amplifier, and
wherein, when the second switch is turned on, the first switch is turned off,
and the gain switch circuit corrects the input voltage based on the voltage
fed back from the second current detection amplifier.
- [4] The motor driver of claim 3,
wherein the gain switch circuit comprises:
a first resistor whose resistance is switchable, the first resistor receiving the
input voltage at one end thereof and having another end thereof
connected to an input side of the current output driver;
a second resistor receiving at one end thereof an output of the first current
detection amplifier;
a third resistor receiving at one end thereof an output of the second current
detection amplifier;
a third switch having three contacts, the third switch having one contact
thereof connected to a node between the first resistor and the input side
of the current output driver, the third switch having the other two
contacts thereof connected respectively to another end of the second
resistor and another end of the third resistor.
- [5] The motor driver of claim 4,

wherein, when the first switch is turned on, the third switch electrically connects the second resistor to the input side of the current output driver; and

wherein, when the second switch is turned on, the third switch electrically connects the third resistor to the input side of the current output driver.

[6] The motor driver of claim 5,

wherein the following relationship is fulfilled:

$$R2a / (K1 \times RS1) = R2b / (K2 \times RS2)$$

where RS1 and RS2 represent resistances of the first and second detection resistors, respectively; R2a and R2b represent resistances of the second and third resistors, respectively; and K1 and K2 represent gains of the first and second current detection amplifiers, respectively.

[7] The motor driver of claim 4,

wherein the following relationship is fulfilled:

$$R2a / (K1 \times RS1) = R2b / (K2 \times RS2)$$

where RS1 and RS2 represent resistances of the first and second detection resistors, respectively; R2a and R2b represent resistances of the second and third resistors, respectively; and K1 and K2 represent gains of the first and second current detection amplifiers, respectively.

[8] The motor driver of claim 2,

wherein the gain switch circuit comprises:

a first resistor whose resistance is switchable, the first resistor receiving the input voltage at one end thereof and having another end thereof connected to an input side of the current output driver;

a second resistor receiving at one end thereof an output of the first current detection amplifier;

a third resistor receiving at one end thereof an output of the second current detection amplifier;

a third switch having three contacts, the third switch having one contact thereof connected to a node between the first resistor and the input side of the current output driver, the third switch having the other two contacts thereof connected respectively to another end of the second resistor and another end of the third resistor.

[9] The motor driver of claim 8,

wherein, when the first switch is turned on, the third switch electrically connects the second resistor to the input side of the current output driver; and

wherein, when the second switch is turned on, the third switch electrically connects the third resistor to the input side of the current output driver.

[10] The motor driver of claim 8,

wherein the following relationship is fulfilled:

$$R2a / (K1 \times RS1) = R2b / (K2 \times RS2)$$

where RS1 and RS2 represent resistances of the first and second detection resistors,

respectively; R2a and R2b represent resistances of the second and third resistors, respectively; and K1 and K2 represent gains of the first and second current detection amplifiers, respectively.

[11] The motor driver of claim 2,
wherein the current output driver, the gain switch circuit, the first and second switches, and the first and second current detection amplifiers are built as a single semiconductor integrated circuit device.

[12] A magnetic disk apparatus comprising:
the motor driver of one of claims 1 to 11;
the direct-current motor whose driving is controlled by the motor driver; and
a magnetic head that is moved in a direction of a radius of a magnetic disk by being fed with power from the direct-current motor.